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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,283	02/06/2004	Saichirou Kaneko	50195-414	4944
7590 07/13/2005				
McDERMOTT, WILL & EMERY 600 13th Street, N.W. Washington, DC 20005-3096		EXAMINER ABRAHAM, FETSUM		
		ART UNIT PAPER NUMBER		
		2826		
DATE MAILED: 07/13/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/772,283

Applicant(s)

KANEKO ET AL.

Examiner

Fetsum Abraham

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 April 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4-7 and 21-28 is/are allowed.
- 6) ☒ Claim(s) the rest is/are rejected.
- 7) ☒ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>2/6/04</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

### DETAILED ACTION

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3,8-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamatoto et al 6,737,722).

As claims 1,3 the prior art discloses a SiC based BJT (see column 11, 10-20), the structure shown in the front page having a collector and emitter regions of first conductivity type on the sides of a graded base, its impurity density defined by the profile in figure 4, whereby the carrier density of the base at the base/emitter junction exceeds that at the base/collector junction by about two orders of magnitude. Clearly, a space charge density is inherent in any PN junction and the built in voltage at any PN junction inherently causes depletion at the junction. Therefore, depletion exists upon contact at both ends of the base.

The claim language states a base region condition where "no depletion layer is formed" and relates the carrier density at that condition to said "space charge density of a depletion layer" in the same region in the last paragraph of claim1. The first condition is understood to be one when a forward bias is applied at the PN junction between the base region and one of the emitter and the collector regions. The forward bias clearly must overcome the inherent depletion at the junction. The second condition, however, involves depletion as a function of the existence of a space charge region. This

condition is understood to be a condition of no bias at the base and the emitter or collector regions or a reverse bias at the respective regions, which would add depletion to the already depleted space charge region.

The above condition gives the examiner the freedom to conclude a typical bipolar transistor in operation (a reverse bias application in the base/emitter regions and a forward bias application in the base/collector regions). Therefore, although there is no word to word matching between the prior art and the claim language, it would have been obvious to one skilled in the art to safely conclude the prior art BJT with the profile in figure 4 reading the claimed invention, since a no-depletion condition at the base/collector junction with a forward bias application to the collector and base regions as having less free carriers than at the junction between the base and the emitter whether at space charge condition due to built-in voltage or at a reverse bias operating condition of conventional BJTs.

As for claim 2, there is at least a difference of one and half order of magnitude in carrier concentration between the base/emitter and the base/collector junctions of the prior art according to figure 4.

As for claim 8, boron is a known P-type dopant material applicable in doping a base layer in NPN BJTs.

As for claims 9-20, the end result of the methods converges to the structure in claim 1 and **"product by process" claims** are directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685 and In re Thorpe, 227 USPQ 964, 966. Therefore, the way the product was made does not carry any patentable weight as long as the claims are directed to a device. Further, note that the applicant has the burden of proof in such cases, as the above case law makes clear. Also see MPEP 2113.

Claims 4-7, 21-28 are allowed.

The punch-through stop element adjacent the emitter region and the motivation for having it in that particular location of the claimed SiC based BJT is not taught or rendered obvious by the prior arts.

Applicant's submission of the requirements for the joint research agreement prior art exclusion under 35 U.S.C. 103(c) on 4/14/05 prompted the new ground(s) of rejection under 37 CFR 1.109(b) presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.02(I)(3). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

#### Response to applicant's argument

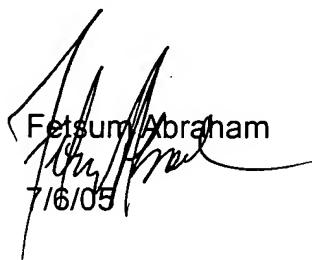
Please note that applicant's argument in the response to the last action had been fully considered and a more detailed reason for rejection provided as a result to accommodate a possible applicant's difficulty of understanding the examination approach. Most of the argument is based on theory rather than physically supported

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analysis. Like wise, the rejection is modified to provide theoretical understanding of the prior art from the broadest sense of the structure and its profile in figure 4. In view of applicant's lack of providing a common structural ground for discussion, a thorough theory behind the prior art was found to be the response by default to the argument.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fetsum Abraham whose telephone number is: 571-272-1911. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915.

  
Fetsum Abraham  
7/6/09